



MINISTER CAICA LAUNCHES  
WILLUNGA SUPERSCIENCE



COCKBURN RIVER FIELD TRIP



TI TREE BASIN FIELD TRIP

THIS EDITION SHOWCASES THE MINISTERIAL LAUNCH OF THE WILLUNGA SUPERSCIENCE SITE AND PRESENTS UPDATES ON TWO OF OUR FIELD SITES, COCKBURN RIVER IN NSW AND TI TREE BASIN IN THE NT. ALSO PROFILED IS THE NEWLY COMMISSIONED CENTRIFUGE FACILITY AT THE UNIVERSITY OF NSW, AND MEET THE RECIPIENT OF THE SINCLAIR KNIGHT MERZ/NCGR UNDERGRADUATE SCHOLARSHIP.

## FROM THE DIRECTOR



Welcome to the latest edition of ReSource, the quarterly newsletter that updates on you the latest news and events at the National Groundwater Centre. This year is off to an exciting start, with the arrival of new students, researchers and eminent visitors. A very warm welcome to you all!

Our key area of focus in 2011 is on maximising the Centre's research impact. Our Advisory Board meeting on 2 March provided an important opportunity for us to test our initial thinking on how our researchers can individually and collectively maximise the economic, environmental and social impact of the Centre's research.

We have commissioned a Pathway to Impact project with the aim of developing a framework to help identify and prioritise the Centre's future research activities. An important part of this process involves developing processes for prioritising,

measuring and evaluating the impact of our work so the Centre can deliver on its commitment to undertake groundwater research that delivers tangible benefits for Australia.

The Pathway to Impact project is of critical importance to the Centre. We will be consulting our key industry, government and research stakeholders over the next few weeks on the project's terms of reference and governance structure. You are welcome to contact me at [director@groundwater.com.au](mailto:director@groundwater.com.au) if you are interested in getting involved in this project.

Research impact is also a key discussion issue arising out of our ongoing Research Program Reviews. These reviews are an important part of the Centre's Continuous Improvement Strategy and provide an important opportunity for our internal and external reviewers to provide constructive feedback on our progress to date.

Research Program 2 Hydrodynamics and Modelling of Complex Groundwater Systems and Research Program 3 Surface Water - Groundwater Interactions underwent their reviews in March. The outcomes of the review process are currently being finalised and will shortly be reported back to Program Leaders, Chief Investigators and their wider research teams so they can develop and implement strategies that address the review team's recommendations.

In the meantime the scale and complexity of the Centre's activities continue to grow. In response to this we have made some important changes within the Centre's Management Team. Joanne Barbaro, has taken over operational management of the Centre's Industry Training Team. Joanne has a strong background in groundwater issues having previously worked as the Centre's Executive Officer and at the National Water Commission.

Joanne is joined by two new training team members, Fiona Adamson and Stacey Richardson, and Lauren Moore who returns from Maternity Leave in October. This new team will ensure that our industry training program goes from strength to strength.

We are also currently recruiting for a Strategic Development Manager, who will work closely with me and the Centre's Deputy Director Professor Peter Cook, on all aspects of the Centre's strategic development and external engagement strategies. I am looking forward to introducing the successful candidate to you in the next edition of ReSource.

Finally, I would like to take this opportunity to officially welcome the NSW Office of Water into the Centre partnership. We are looking forward to working with the Office of Water on some key groundwater research projects.

*Craig T. Simmons*

# RESEARCH HIGHLIGHTS



Two NCGRT bores within the Willunga Basin

## WILLUNGA SUPERSCIENCE AND SCHOLARSHIP LAUNCH

This month, the NCGRT was pleased to launch the Willunga SuperScience Site.

Officially opened by the Hon Paul Caica, Minister for Water, the Willunga site is one of five highly instrumented and coordinated field research SuperScience sites around the country, which have attracted funding of \$15 million and will establish long-term monitoring for climate change impacts on groundwater.

Research at the site will explore groundwater flow and solute transport processes in simple and complex aquifer systems, interactions between groundwater and river systems, interactions between groundwater, vegetation and climate, as well as social and policy dimensions to groundwater systems.

## CENTRIFUGE FACILITY

A world class centrifuge permeameter facility has been commissioned for the National Centre for Groundwater Research and Training (NCGRT). Funded by the Australian Research Council and National Water Commission, the facility was commissioned in late 2010 at the UNSW Water Research Laboratory, located on Sydney's northern beaches.

The facility, including a Broadbent G-max geotechnical centrifuge, will be available to researchers from various agencies, and will provide services to industry.

It's one of only two large centrifuge permeameters in the world, capable of measurements during flight. It's the only

Also launched was the Aboriginal Groundwater Scholarship, a joint initiative of the Department for Water and the NCGRT.

High quality science and monitoring of South Australia's water enables us to better allocate water between communities, industry and the environment. This is a welcome opportunity for an indigenous student to train in this area.

The scholarship offers an indigenous student the opportunity of full tuition and paid work experience within the Department for Water with a graduate role offered upon completion.

The successful candidates will be announced shortly and we look forward to introducing them in our next edition .

centrifuge permeameter capable of testing 100 mm diameter drill core which is essential for measuring permeability of swelling clay and the speed at which chloride and other contaminants leak through.



Centrifuge Permeameter

# TRAINING HIGHLIGHTS

## SOIL & GROUNDWATER POLLUTION COURSE

In collaboration with the US Ground Water Association, NCGRT Industry Training delivered two Soil and Groundwater Pollution courses in February and March. The presenters, Robert Cohen, Principal Hydrogeologist, and Tyler Gass, Executive Vice President of GeoTrans Inc are both published authors and are highly distinguished in the field.

The course provided the participants with an understanding of the importance of groundwater processes related to soil and groundwater pollution. The course reviewed fundamentals of groundwater hydrology, and the mechanisms of soil and groundwater contamination. Different types of contaminants were considered, including NAPLs (non-aqueous phase liquids) and DNAPLs (dense non-aqueous phase liquids) and case studies were used to explore the different concepts.

## GETTING TO KNOW GROUNDWATER/SURFACE WATER COURSE

This flagship course was held in Sydney in March with presenters representing industry, government departments, consulting and universities. This course was designed for practical training in hydrology for non-specialists who work with groundwater and surface water and provided a practical foundation for the intermediate level course, the Australian Groundwater School to be held on 11-15 April in Brisbane.

## HYDROCHEMISTRY AND ENVIRONMENTAL ISOTOPES WORKSHOP

This workshop was held in Adelaide in February and led by Andrew Love, Flinders University and Paul Shand, CSIRO. The workshop provided introductory training in the principles of aqueous chemistry and the application of hydrochemical and isotope tracers for evaluation of groundwater systems (water-rock interactions, recharge rates/mechanisms, flow direction, inter-aquifer mixing, groundwater residence time, hydraulic processes affecting water quality); and included practical demonstrations.

## RESEARCH HIGHLIGHTS



PhD Student Chani Welch flow gauging in the Cockburn River

*‘The results obtained from the surviving loggers have provided vital information to assist with developing the project.’*

### COCKBURN RIVER FIELD TRIP

In January 2011, Professor Peter Cook, Dr Mark Trigg and Chani Welch (pictured above) returned to the Cockburn River, near Tamworth, NSW, to conduct a second round of field investigations for a P3 PhD project investigating the temporal variability of the chemistry of groundwater as it discharges to rivers.

The Cockburn River has a catchment of approximately 1100km<sup>2</sup>, with the upper portion in fractured rock and the lower part spreading out into an alluvial floodplain as the river heads towards its confluence with the Peel River. This change in geology along its length makes the Cockburn an ideal research site for the current study.

The area was first visited as part of the current project in October 2010, when a longitudinal river survey was completed and a number of level and salinity loggers installed in the river and adjacent piezometers.

The purpose of the January visit was to meet with NSW Office of Water representatives working in the area, repeat the river survey under different hydrological conditions, download data from the installed loggers, and increase the density of the monitoring network. In particular, the group were keen to see the impacts of a large flow event in December 2010 when the daily flow rate got up towards 38,000ML/day compared to the standard 1-2000ML/day.

As it turned out, the flows had not been high enough to break the banks in many places, but claimed one of the in-stream loggers installed in one of the main tributaries – flood debris was visible 5m up in the trees, but the logger and its mooring were nowhere to be found.

The results obtained from the surviving loggers have provided vital information to assist with developing the project.



Fig 1. Water level logger in the Woodforde River



Fig 2. Ti Tree Basin Map View



Fig 3. Ti Tree Basin Aerial View

### TI TREE BASIN FIELD TRIP

Recently a small group from the NCGRT Program 3, consisting of Professor Peter Cook, Margaret Shanfield, Nick White and accompanied by Anthony Knapton, Northern Territory Department of Natural Resources, Environment and The Arts (NRETA), travelled to the NCGRT Superscience site at Ti Tree. The site at the Ti Tree Basin lies approximately 180km north of Alice Springs and includes the Woodforde River in its catchment.

The purpose of the visit was to follow up work carried out in July 2010 installing water level loggers into the river bed and also surface water level loggers. Additional water level

loggers were installed during this visit. In all, seven loggers monitoring groundwater levels have now been placed in the river bed of the Woodforde and a further eight have been placed on the surface of the river to measure river flow events and flow height. The monitoring at this site now covers approximately 20km of the Woodforde River starting close to its source in the Hart Range.

The field group also installed a solar powered webcam overlooking the Woodforde River so that river flow events could be observed and recorded. Such events are not usually seen due to the remoteness of the site and

also because the Woodforde River only flows once to twice a year, when the catchment has received sufficient rainfall. Hopefully a successful trial of this webcam could see further SuperScience sites being monitored remotely in the future.

Ironically, the Woodforde flowed on this field trip, however due to severe thunderstorms and heavy rain the camp was abandoned one day early. On arrival back in Adelaide the webcam did show evidence that the river had flowed while the group were travelling back.

# RESEARCHER PROFILE



*‘Australians have set the bar professionally, and I would like to take this application of the extension of ideas home with me’*

**DR FABIEN MAGRI** is part of our Visiting Scholars Program, has been in Australia for two months and comes to us from the Freie Universität Berlin, Germany.

**WHAT IS YOUR PROJECT?** Hot Geothermal Fluids in Turkey. I want to understand the mechanisms and driving forces of geothermal fluids in Western Turkey, especially in relation to faults and fractures.

**WHAT DO YOU HOPE TO ACHIEVE DURING YOUR TIME AT THE NCGRT?** A better understanding of the theory underlying the convective flow of hot fluids. I feel that Australian science is quite advanced from a theoretical point of view with regard to convective flow and I have a high level of field based knowledge, so the collaborative potential is great. I am hoping that the development of a joint publication or further projects may eventuate from this visit.

**WHAT WOULD YOU LIKE TO CONTRIBUTE TO THE FIELD OF GROUNDWATER RESEARCH?** I would like to gain insights into the 3-dimensional dynamics of convective flow. Field based studies help because they are real observations.

**WHAT WOULD YOU LIKE TO SEE ACHIEVED ‘BIG PICTURE’ IN GROUNDWATER RESEARCH IN 2011?** A general (universal) theory that could predict, or indicate, the most likely convective modes given the physical properties of the basin in which these flows occur.

**WHAT IS THE BEST THING YOU HAVE EXPERIENCED SO FAR?** The interaction with other students and staff, and the way in which students are encouraged to share ideas and collaborate by giving talks and presentations. People wanting to share in my knowledge and the opportunity to express my ideas to a wider audience such as the readers of this newsletter. Australians have set the bar professionally in this way, and I would like to take this application of the extension of ideas home with me.

**WHERE DO YOU SEE YOURSELF IN 5 YEARS?** In a field related area with more career stability.

**WHAT DO YOU ENJOY DOING IN YOUR LEISURE TIME?** Buying and cooking fresh food and experiencing the wonder of the Australian natural world. I enjoy water-based pursuits such as windsurfing, swimming and fishing.

## AWARDS & PRIZES



**SKM/NCGRT UNDERGRADUATE SCHOLARSHIP**  
NCGRT and Sinclair Knight Merz Consulting are pleased to award their Undergraduate Scholarship to Thomas Neill.

Thomas is completing a Bachelor of Science (Honours), an enhanced 4-year program at Flinders University for high achievers. It provides opportunities to undertake scientific research from the 1st year, undertake inquiry-based learning and extended science studies and study with other high achieving students.

Thomas’s scholarship will provide him with \$15,000 towards his tuition and the opportunity of paid work experience with SKM Consulting each year.

### **PLAYFORD MEMORIAL TRUST HONOURS SCHOLARSHIP**

NCGRT Honours student Megan Sebben was the well-deserved recipient of the Playford Memorial Trust Honours Scholarship for her project aimed at examining the limits in applicability of physically based computer models that simulate both surface water and groundwater domains, with a focus on their application in catchment-scale water resources investigation. The novel element of the research will be the development of a new test case for assessing and comparing surface-subsurface modelling codes.

### **EUREKA PRIZE FOR WATER RESEARCH AND INNOVATION**

This prize is for research and innovation in the sustainable use and management of Australia’s water resources. \$10,000 will be awarded to an individual, team

or organisation for a project that has the potential to lead to substantial change in the way Australia manages, uses or protects its water resources, particularly in rural Australia. See prize details here.

For more details contact (02) 9320 6483 or email [eureka@austmus.gov.au](mailto:eureka@austmus.gov.au)

### **1ST INTERNATIONAL SPATIAL STATISTICS CONFERENCE**

Gregoire Mariethoz was awarded best paper and presentation for his paper Mariethoz, G and Kelly, B (2011) ‘Parameterizing training images used for multiple-point simulations’.



# EVENTS



**11TH AUSTRALASIAN ISOTOPE CONFERENCE & 4TH AUSTRALASIAN HYDROGEOLOGY RESEARCH CONFERENCE**  
NCGRT and James Cook University proudly present this joint conference; providing a stimulating forum for the presentation of a diverse range of interdisciplinary Australasian research, spanning the earth and biological sciences.

To view the flyer click [here](#).  
To register please visit [www.jcu.edu.au/AElandAHRconferences2011](http://www.jcu.edu.au/AElandAHRconferences2011)

**DISTINGUISHED LECTURER SERIES**  
NCGRT is pleased to announce the Australian Distinguished Lecturer in Groundwater Science program. The program is based on the highly successful National Ground Water Association (NGWA) Darcy Distinguished Lecture series, and the Geological Society of America Birdsall-Dreiss Lecture series.

We have been fortunate in securing several of the Darcy and Birdsall-Dreiss lecturers to visit Australia in recent years. The Australian Distinguished Lecturer will be awarded annually to an eminent Australian hydrogeologist, and will cover travel expenses for them to present lectures on their work throughout Australia.

The first Distinguished Lecturer for 2011, is Professor John Doherty. John is an environmental modelling consultant who has been involved in the water industry for 35 years. John will be presenting his lecture Models and Management: From Crystal Balls to Risk Assessment through June-August this year.

His lecture aims to demonstrate and explain model-based uncertainty analysis based on principles of highly parameterized inversion, and to show that use of these methods in a decision-making context can significantly enhance the decision-making process.

To view the flyer click [here](#).

Please visit [conferences@groundwater.com.au](mailto:conferences@groundwater.com.au) to register your interest in hearing Professor Doherty speak at your venue.

**TALL POPPY ENVIRONMENTAL FORUM**  
The Centre in collaboration with the Tall Poppy Campaign have planned to hold a school seminar for students of yrs 10-12 on Thursday 7 July 2011 in Adelaide. The forum will showcase various aspects of environmental science including groundwater, marine biology, geology, hydrology, chemistry and agricultural biotechnology. Researchers and Industry will be called upon to highlight career pathways in groundwater & environmental science and the importance of continued research.

**XXV IUGG GENERAL ASSEMBLY**  
28 June - 7 July 2011  
Melbourne Convention & Exhibition Centre, Melbourne, Australia  
Earth on the Edge: Science for a Sustainable Planet

Understanding and quantifying physical and geochemical processes during artificial recharge of groundwater.

For more information visit: <http://www.iugg2011.com/>

**INTERNATIONAL CONFERENCE ON GROUNDWATER**  
19-21 September 2011  
CSIR International Convention Centre, Pretoria South Africa.

Organised by the Groundwater Division of the Geological Society of South Africa (GSSA) in association with the International Association of Hydrogeologists (IAH).

Our source of security in an uncertain future

Email [confplan@iafrica.com](mailto:confplan@iafrica.com) or visit [www.gwd.org.za](http://www.gwd.org.za)

## INDUSTRY TRAINING

### AUSTRALIAN GROUNDWATER SCHOOL

11-15 April, Brisbane  
26-30 September, Melbourne

This course is Australia's primary groundwater training program. The School offers a broad overview of groundwater processes and is led by a distinguished group of industry professionals.

See course flyer [here](#).

### SURFACE WATER-GROUNDWATER INTERACTIONS WORKSHOP

19-20 May, Sydney

This course is aimed at surface water and groundwater professionals working in government agencies, industry and the consulting companies that support these organisations. It is particularly focused on the issue of double accounting of surface water and groundwater and would most benefit those who deal with the investigation, assessment and management of this water allocation issue.

See course flyer [here](#).

### GROUNDWATER FOR DECISION MAKERS

25 July, Canberra

This course is designed for professionals in consulting, research and the public authorities to enable them to better inform decision-making processes.

### AUSTRALIAN GROUNDWATER MODELLING SCHOOL

8-11 August, Sydney

This course is aimed at those who undertake groundwater modelling as part of their work, or who review the work of others, and is designed to illustrate the practical development of groundwater flow and solute transport modules using GMS.

### FEFLOW MODELLING WORKSHOP

19-23 September, Adelaide

This course is aimed at groundwater professionals in consulting, research and public authorities and covers the use of FEFLOW and its application to two and three-dimensional groundwater problems.

# ANNOUNCEMENTS

## PARTNERS

The NCGRT warmly welcomes the **NSW Office of Water** as a collaborative partner. Key collaborative projects are being developed in the Cockburn River catchment, Namoi region and Liverpool Plains. We look forward to working together in achieving common goals and sharing resources and expertise.

## NEW STAFF

We are pleased to welcome three new staff members to the Centre Management Team: Stacey Richardson and Fiona Adamson join the Industry Training team and bring with them a wealth of experience and knowledge.

Dara Boucher joins the Marketing team and will be working to bring Centre news and activities to the fore.

## PRESENTATIONS

### BRINGING WATER SCIENCE TO THE SURFACE SEMINAR SERIES

#### *Willunga Basin: Creating a Hydrological Observatory*

NCGRT presented the first in our Bringing Water Science to the Surface Seminar Series for 2011. The seminar presented the current knowledge of the water resources of the Willunga Basin, the infrastructure installation and research projects being developed. There were presentations from representatives from the Department for Water, SA Water, Flinders University and the Australian National University.

The seminar was recorded so keep your eye on our website to view the video.

### HYDROLOGICAL SOCIETY OF SA

**Professor Craig Simmons** presented at the recent Technical Meeting of the Hydrological Society of SA and provided an update on Centre activities, illustrated with current projects of particular relevance to South Australians.

## VISITING SCHOLARS

**Dr Fabien Magri**, Freie Universität Berlin, is working on hydrogeology projects during his 3 month stay.

**Dr Randy Hunt**, United States Geological Survey, is working on hydrogeology projects during his 6 month stay.

**Dr Enrico Hamann**, Freie Universität Berlin, is working on hydrogeology projects during his 6 month stay.

## GUESTS

**Mr Bob Cohen**, a member of the US National Groundwater Association has been invited to present seminars as part of our Industry Training Program for 2011.

**Mr Tyler Gass**, member of the US National Groundwater Association has been invited to present seminars as part of our Industry Training Program for 2011.